

**Low Temperature Thermal
Desorption-Treated Soil
Tracking and Management
Plan**

**Presidio of San Francisco,
California**

1 November 2004

Prepared For:

**The Presidio Trust
San Francisco, California**

Prepared By:

**Erler & Kalinowski, Inc.
Burlingame, California**

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Via Federal Express

November 1, 2004

Mr. James Ponton
Regional Water Quality Control Board
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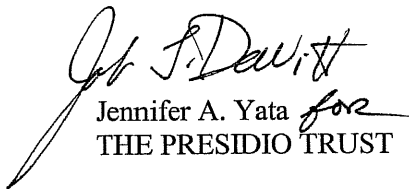
**RE: Low Temperature Thermal Desorption-Treated Soil Tracking and Management Plan
Presidio of San Francisco**

Dear Mr. Ponton:

Enclosed please find a copy of the *Low Temperature Thermal Desorption-Treated Soil Tracking and Management Plan*, dated November 1, 2004, prepared by Erler & Kalinowski, Inc. for the Presidio Trust. This document was prepared in accordance with Task 14 of the Regional Water Quality Control Board (RWQCB) Order for the Presidio of San Francisco (Order No. R2-2003-0080). This document was also submitted in compliance with the November 1, 2004 due date required by the Presidio Petroleum Time Schedule.

If you have any questions or additional comments, please contact me at (415) 561-4272.

Yours very truly,


Jennifer A. Yata *for*
THE PRESIDIO TRUST

Enclosure

cc: Robert Boggs, DTSC
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**LOW TEMPERATURE THERMAL DESORPTION-TREATED SOIL
TRACKING AND MANAGEMENT PLAN**

PRESIDIO OF SAN FRANCISCO, CALIFORNIA

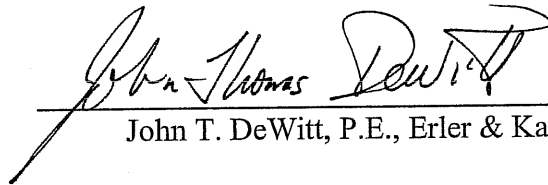
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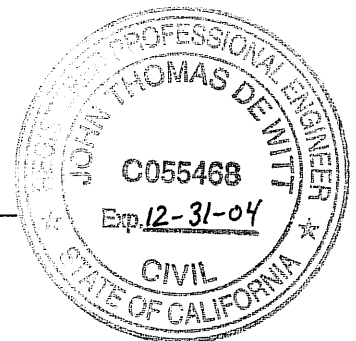
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1 November 2004



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11-1-04

Date

**LOW TEMPERATURE THERMAL DESORPTION-TREATED SOIL TRACKING AND
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Presidio of San Francisco, California**

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§	Section
Area A	Primarily the coastal areas of the Presidio, under the jurisdiction of the National Park Service
Area B	Upland areas of the Presidio, under the jurisdiction of the Presidio Trust
AST	above ground storage tank
BBL	Blasland, Bouck & Lee, Inc.
BTEX	benzene, toluene, ethylbenzene, and xylenes
CFR	Code of Federal Regulations
DQOs	data quality objectives
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
EKI	Erler & Kalinowski, Inc.
FDS	fuel distribution system
FSP	field sampling plan
GIS	geographical information system
GMPA	General Management Plan Amendment
IT	International Technology Corporation
LTDD	low temperature thermal desorption
LUCMRR	Area B Land Use Controls Master Reference Report
NPS	United States Department of the Interior, National Park Service
PAH	polycyclic aromatic hydrocarbon
Presidio	Presidio of San Francisco
PTMP	<i>Presidio Trust Management Plan, Land Use Policies for Area B of the Presidio of San Francisco</i> , dated May 2002 (presents Trust's vision for use of Area B of the Presidio)
RAB	Restoration Advisory Board
RWQCB	California Environmental Protection Agency, Regional Water Quality Control Board, San Francisco Bay Region
SCR	Site Cleanup Requirements
SOP	Standard Operating Procedures

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Trust	The Presidio Trust
U.S. Army	United States Department of Army
U.S. EPA	United States Environmental Protection Agency
UST	underground storage tank
VMP	<i>Vegetation Management Plan</i> , Trust and NPS, dated May 2001 (identifies existing and planned plant communities at the Presidio)

1 INTRODUCTION

On behalf of the Presidio Trust (“Trust”), Erler & Kalinowski, Inc. (“EKI”) has prepared this soil tracking and management plan for Low Temperature Thermal Desorption-treated soil (“LTTD soil”) that has been reused at the Presidio. This LTTD Soil Tracking and Management Plan (“LTTD Plan”) describes procedures to be followed to track and manage LTTD soil at the Presidio. The plan is intended to apply to the entire Presidio, including Area A, which is under the jurisdiction of the National Park Service (“NPS”).

1.1 Purpose of Plan

The purpose of this plan is to:

- (1) Comply with the requirements of Task 14 “Low Temperature Thermal Desorption (LTTD) Soil Tracking and Management” contained in Order R2-2003-0800 issued by the California Regional Water Quality Control Board, San Francisco Bay Region (“RWQCB”) on August 20, 2003 (“Order”);
- (2) Standardize the tracking and management of known and unknown LTTD soil at the Presidio; and
- (3) Serve as an addendum to the Trust’s Area B Land Use Controls Master Reference Report (“LUCMRR”) to address LTTD soil.

The Order essentially establishes land use restrictions for all LTTD soil, wherever encountered on the Presidio. This LTTD Plan serves as an addendum to the LUCMRR to address and enforce the land use restrictions associated with all LTTD soil within Area B of the Presidio.

To track LTTD soil, this Plan identifies areas known to have been backfilled with LTTD soil based on information provided by the Army. When previously unknown areas backfilled with LTTD soil are encountered, these areas will be added to this Plan through the Trust’s tracking system. To manage LTTD soil, this LTTD Plan provides procedures to address LTTD soil if and when such soil is encountered at the Presidio, whether or not its presence was expected. If previously unknown chemically-impacted soil is encountered in addition to LTTD soil, the appropriate Presidio Contingency Plan will guide the Trust’s course of action.

1.2 LTTD Soil Management Requirements

Task 14 of the Order specifically requires the Trust to minimize the disturbance of LTTD soils. The specific management requirements of the Order are as follows:

- Reuse of LTTD soil must maintain a minimum setback distance of fifty feet from any lake, creek, stream, or spring;

- Concentrations of polycyclic aromatic hydrocarbons (“PAHs”) and other petroleum-related constituents shall be below applicable cleanup levels (including those established for the saltwater and freshwater aquatic protection zones identified in the Order); and
- No detectable concentrations of petroleum-related constituents are present in the top 18 inches of excavations backfilled with LTTD soil.

These management practices are described in more detail in Section 3.

Although not explicitly stated in the Order, the Trust understands that the exclusion of LTTD soil within the top 18 inches of the backfill applies to landscaped or vegetated areas to ensure the vegetated soil has not been sterilized by heat treatment. The Trust understands that LTTD soil has been and may continue to be used to backfill excavations in paved areas or under building foundations up to the base rock or subgrade below the paved surface or the building foundation.

2 HISTORY AND CHARACTERISTICS OF LTTD SOIL

This section describes the history and characteristics of the LTTD soil, including the process the Army used to treat the soil. Disposition of the treated LTTD soil and areas where LTTD soil may be encountered are also identified.

2.1 History of the LTTD Soil

The Army's LTTD soil treatment process is described in the Army's report entitled *On-Site Soil Treatment Using Low Temperature Thermal Desorption, Final Project Report*, dated June 1998 (Montgomery Watson, 1998). In 1993, the Army began removal and closure of aboveground and underground fuel storage tanks ("ASTs" and "USTs") throughout the Presidio. In 1996, the Army also began dismantling and removing the fuel distribution system ("FDS"), a network of pipes installed around 1900 to distribute fuel oil to approximately 300 USTs throughout the Presidio. The FDS system provided heating oil to administrative buildings and residences throughout the Presidio until the early 1960s.

The Army identified LTTD as a process that would allow excavated soil from fuel release sites, such as UST, AST, and FDS removal operations to be treated at the Presidio, tested, and once confirmed to meet cleanup levels, reused as backfill in ongoing FDS, UST, and AST excavations. Only soil impacted with petroleum hydrocarbons was accepted for treatment by the LTTD process. The RWQCB adopted Order No. 96-070, which established the Site Cleanup Requirements ("SCRs") for the reuse of LTTD soil.¹ The SCRs also included risk-based soil cleanup levels for the concentrations of petroleum hydrocarbons and PAHs in soil.

2.2 LTTD Treatment Process

According to Montgomery Watson (1998), the Army created a LTTD soil treatment area west of Building 610 at the Presidio. Pre- and post-treatment soil staging areas, decontamination areas, and a thermal treatment process area were constructed in 1996. Petroleum-impacted soil from AST, UST, and FDS removals was brought to the lined staging area to await treatment.

The treatment process included a feed system, soil treatment unit, a bag house, and a thermal oxidizer. Impacted soil was fed into the feed system where it was screened to break clumps and remove debris greater than 2 inches. The screened soil was then conveyed to the soil treatment unit where it was heated to temperatures of 600° to 700° F. The heated soil was quenched with water as it exited the system to cool the soil and control dust. Exhaust gases from the soil treatment unit contained particulate matter and uncombusted petroleum hydrocarbons. The exhaust gases were treated in the bag house to remove the particulates, and then the filtered gases were treated in a thermal oxidizer which combusted residual organics at temperatures of 1,400° F. The exhaust gas system discharged to the atmosphere. The soil treatment unit,

¹ The SCRs were rescinded upon the RWQCB's adoption of Order No. R2-2003-0080.

baghouse, and the thermal oxidizer equipment operated in compliance with a permit from the Bay Area Air Quality Management District (Montgomery Watson, 1998).

Batches of treated soil were stockpiled and sampled to confirm treatment goals were obtained. Soil treatment goals were as follows:

Parameter	Soil Treatment Goal
Total Petroleum Hydrocarbons (“TPH”) (sum of gasoline, diesel, and fuel oil)	100 mg/kg
Benzene	0.005 mg/kg
Toluene	0.005 mg/kg
Ethylbenzene	0.005 mg/kg
Total Xylenes	0.005 mg/kg
Total Carcinogenic PAHs	<5.6 mg/kg
Synthetic Precipitation Leaching Procedure (“SPLP”) TPH-purgeable	<770 µg/L
SPLP TPH-extractable	<880 µg/L
SPLP Benzene	<1 µg/L
SPLP Toluene	<150 µg/L
SPLP Ethylbenzene	<700 µg/L
SPLP Total Xylenes	<170 µg/L

Soil that did not achieve treatment goals was sent back into the treatment unit for additional treatment. Soil that met treatment goals was stockpiled for reuse. Analytical sampling results from the batches of treated LTTD soil are tabulated in Appendix A of the Montgomery Watson report (1998).

The Army treated soil with the LTTD system from 11 July to 15 August 1996, and from 29 October 1996 through 7 May 1997. The Army treated approximately 12,000 to 16,000 cubic yards of petroleum-impacted soil. The LTTD treated soil was reportedly used to backfill AST, UST, and FDS excavations at the Presidio. No treated soil was hauled off-site for disposal (Montgomery Watson, 1998).

2.3 Locations of LTTD Treated Soil

As indicated above, LTTD soil was used by the Army to backfill excavations of petroleum-impacted soil. Prior to placing LTTD soil, the Army checked the proposed backfill location to verify the location was not within 50 feet of a lake, creek, stream, or spring. Montgomery Watson (1998) indicates a load ticket procedure was used to track treated LTTD soil, analytical results, and final backfill location. No records identifying final backfill locations are included in Montgomery Watson’s report. However, in the *Fuel Distribution System Closure Report* (IT, 1999b), the batch number and associated analytical data are included for batches of LTTD soil used to backfill FDS sections and associated overexcavation areas. Miscellaneous information

obtained from the Army (Army, Various Dates) identifies additional locations backfilled with LTDD soil and the associated treatment batch numbers for that LTDD soil.

According to the IT report, LTDD soil was used as backfill at overexcavations within approximately 31 FDS sections, as well as within the trench of the FDS excavation at approximately 23 locations (IT, 1999b). In addition, LTDD soil was used to backfill the following tank excavation areas: USTs 937.1 and 937.2 (IT, 1999a); USTs 7, 8, 34, 38.1, 207.1, 207.3, 603, 662.2, 920.3, 979.3, 1029, 1233, 1351, 1362, and FDS-1 and ASTs 970, 1040.1, and 1040.2 (IT, 1998); and USTs 300.2, 640.3, 640.4, 640.5, and AST 300.3 (Army, Various Dates). These locations are shown on Figure 1. The approximate volume of LTDD soil known to be used as backfill throughout the Presidio (Figure 1) is estimated to be approximately 14,700 cubic yards, which is consistent with the total volume of soil estimated to be treated by the Army (12,000 to 16,000 cubic yards). Even though all of the LTDD soil appears to be accounted for, it is possible that some additional LTDD soil has been used as backfill at other locations at the Presidio that are not currently known.

Based on the information presented in the IT reports, no LTDD soil was placed within 50 feet of a lake, creek, stream, or spring (IT, 1998; 1999a; 1999b). Based on the information presented in the Montgomery Watson report, no LTDD soil was discharged with concentrations above residential and terrestrial ecological cleanup levels (Montgomery Watson, 1998). EKI reviewed the post-treatment chemical analytical data from Appendix A of the LTDD treatment report (Montgomery Watson, 1998) to assess whether residual chemical concentrations in the LTDD soil exceed the cleanup levels for the freshwater or saltwater aquatic protection zones. According to data in the Montgomery Watson report, of the approximately 150 batches of LTDD soil, only 13 batches of treated LTDD soil contained total petroleum hydrocarbons ("TPH") quantified as diesel or fuel oil that exceed the freshwater or saltwater ecological cleanup levels in the current order (Montgomery Watson, 1998). Based on the information presented in the IT reports referenced above, LTDD soil was placed (a) in the freshwater ecological protection zone at FDS sections BR10-1, BR10-3, BR13-1, and BR13-2 and at UST 1029 and (b) in the saltwater ecological protection zone at USTs FDS-1, 207.1, 207.2, 207.3, and 603 (Figure 1). The data for the specific batches of LTDD soil used to backfill FDS sections BR13-1 and BR13-2 (IT, 1999b), USTs 207.1, 207.2, and 207.3 (Harding ESE, 2003), and UST 1029 (Army, Various Dates) indicate that post-treatment chemical concentrations in that LTDD soil meet the freshwater and saltwater ecological protection zone cleanup levels. EKI could not locate information that identifies the specific batches of LTDD soil used to backfill the remaining areas listed above (i.e., FDS sections BR10-1 and BR10-3 and USTs FDS-1 and 603). Testing requirements for LTDD soil at these locations and any newly discovered areas with LTDD soil in the freshwater or saltwater ecological protection zones are discussed in Section 3.2.5.

In the future, LTDD soil will likely be encountered in subsurface work that crosses or includes the trenches from former FDS lines and excavations areas that were backfilled with LTDD soil. The known locations of LTDD soil are marked on Figure 1. In addition to these known areas, LTDD soil could potentially also be found within the backfill of former USTs or overexcavations around ASTs. LTDD soil could also be found in the backfill of removed FDS lines or adjacent overexcavations, even though such fill was not recorded in IT's report. The possibility also exists that LTDD soil could also be encountered in areas where the Trust is not aware of a history

of petroleum impact or piping removal. All known and encountered LTTD soil will be tracked and managed in accordance with Section 3 of this report.

2.4 Visual Recognition of LTTD Soil

LTTD soil has a characteristic dark gray or black color that is not typical of native soil and fill at the Presidio, as the soil has been burned to remove hydrocarbons. In addition, LTTD soil is generally odorless, fine grained, contains no rocks, and is placed in compacted layers as backfill. The initial identification will be made by the crew performing the subsurface work. A member of the crew will notify the Trust for discoveries in Area B and the NPS for discoveries in Area A. For Area A discoveries, the NPS environmental staff will subsequently notify Trust environmental staff. An experienced person from the Trust's environmental department staff or its consultants will verify that the observation is actually LTTD soil and will initiate LTTD soil tracking and management procedures under this Plan.

3 TRACKING AND MANAGEMENT OF LTTD SOIL

As indicated in Section 1, the Order requires the Trust to prepare a technical report that includes the tracking and management tools to be used by the Trust to limit or minimize the disturbance of LTTD soils at the Presidio.

For purposes of this Plan, “tracking” of LTTD soil refers to documenting the location of LTTD soil and the associated data. “Management” of LTTD soil refers to the steps that are implemented in the field to actively address issues associated with the presence of LTTD soil. The following sections discuss the tracking and management procedures to be implemented by the Trust (and NPS in Area A) to comply with Task 14 of the Order.

3.1 LTTD Soil Tracking Processes

To comply with the objective of Task 14 of the Order to minimize disturbance of LTTD soil, the locations of LTTD soil at the Presidio must be known and tracked. Both the Trust and the NPS have designated processes and procedures currently in place that can be modified to include the tracking of LTTD soil. These practices are applicable to areas with known LTTD soil as well as areas where LTTD soil is unexpectedly encountered.

3.1.1 LTTD Soil Location Map

Figure 1 of this Plan is a map the Trust has prepared that identifies the known locations where LTTD soil is present at the Presidio, as of October 2004. This map will be updated as new locations of LTTD soil are located or existing LTTD soil is removed throughout the Presidio.

3.1.2 Trust Petroleum Database and GIS Mapping of LTTD Soil Locations

The Trust will track known locations of LTTD soil within its petroleum database and geographical information system (“GIS”). The Trust is in the process of adding the locations and names of former FDS sections and tanks with LTTD soil in the backfill to the Trust’s petroleum database. The input fields for the petroleum database include information about whether LTTD soil was used to backfill remedial excavations associated with USTs, ASTs, FDS trench excavations, or overexcavations to remove additional impacted soil along the FDS trench line. The estimated volume of LTTD soil at each site is also being included in the Trust’s petroleum database. The coordinates of the tank site or FDS section beginning and end are also included in the Trust’s petroleum database, which will allow for a geographic search for the presence of LTTD soil.

The Trust maintains a GIS for Area B of the Presidio to support various departmental needs (e.g., Utilities, Planning, Resources). The GIS also provides a central repository of information that can be used in the Trust’s project review programs (Section 3.1.3). The LTTD soil locations shown on Figure 1 will be included in the Trust’s GIS. A flag indicating that there are restrictions associated with the LTTD soil will also be incorporated into the Trust GIS. Therefore, when other Trust Departments in addition to Environmental (e.g., Utilities, Planning,

Resources) use the GIS, they will be informed of the potential presence of LTDD soil in a potential project area.

The petroleum database and the GIS will also be updated as new locations of LTDD soil are located or existing LTDD soil is removed.

3.1.3 Trust Project Review Process in Area B

Both the Trust and NPS have review processes for planned projects in their respective areas of jurisdiction. The Trust's land use compliance process (i.e., project review programs) is a first step to insure that Trust staff are aware of known environmental issues, including LTDD soil, in the vicinity of project sites. The Trust's N² process is used for compliance with the National Environmental Policy Act ("NEPA"), the National Historic Preservation Act ("NHPA"), and other such regulations. Every project in Area B at the Presidio (e.g., fence post installation, tree trimming, native plant restoration, building renovation, and building demolition) is screened through the Trust's N² process. This review process can be used to alert Trust staff to known and potential locations where LTDD soil may be present. In addition, for any Area B project involving excavation or subsurface work, the Trust requires a "dig permit." The Trust will also use the "dig permit" process to notify and require adherence by excavation project proponents of the LTDD soil tracking and management restrictions and requirements outlined in this Plan.

During the Trust's N² review process, the Trust will also check to be sure proposed projects do not violate the LTDD soil requirements in the Order. For example, if a project includes the restoration of a former stream, a strip fifty feet wide on both sides of the proposed streambed would be checked against the LTDD soil map to verify the stream location would not conflict with the separation required in the Order.

3.1.4 NPS Project Review Process in Area A

The NPS has similar processes (i.e., project review and 5X process) to screen projects for potential site-specific environmental issues. The screening for known LTDD soil will be included in this process for projects in Area A.

NPS will also be provided with a copy of the LTDD soil location map (Figure 1) and any updates to the map associated with LTDD soil in Area A. According to the IT reports (1998; 1999a; and 1999b), LTDD soil has been used as backfill in five locations within Area A (Figure 1); the NPS will be responsible for including this LTDD soil information in its project review process for projects in Area A.

3.2 LTDD Soil Management Processes

LTDD soil would most likely be encountered during construction, maintenance, or other subsurface operations. The presence of LTDD soil may or may not be known prior to the initiation of the work in which LTDD soil is encountered. LTDD soil could be encountered at the locations shown on Figure 1, especially in the areas of former FDS lines and associated excavations and at the AST and UST locations where LTDD soil was used as backfill. However,

the Trust also recognizes that the LTTD soil could potentially be encountered during construction, maintenance, or other subsurface operations at other locations at the Presidio. When LTTD soil is actually encountered, the management processes the Trust will implement to comply with the Order are described below. LTTD soil management procedures for Area A are discussed in Section 3.2.9.

3.2.1 Notification Procedures

The crew performing subsurface work will likely find LTTD soil. A member of the crew will notify the Trust for discoveries in Area B and the NPS for discoveries in Area A. For discoveries in Area A, the NPS environmental staff will notify Trust environmental staff. An experienced person from the Trust's environmental department staff or its environmental consultant will verify that the observation is actually LTTD soil and will initiate LTTD soil management procedures described in this section.

3.2.2 Segregation on LTTD Soil When Encountered

If LTTD soil is found during construction, maintenance, or other subsurface operations, and the LTTD soil will require removal to proceed with the planned work, the LTTD soil will be stockpiled on visqueen separately from non-LTTD soil (e.g., topsoil or adjacent non-LTTD soil). This segregation is required to prevent the mixing of non-LTTD soil with LTTD soil, which would increase to the total volume of LTTD soil that must be tracked and managed under this Plan. For LTTD soil found in Area A, the NPS will be responsible for segregating LTTD soil removed as part of its planned subsurface activities.

3.2.3 Address LTTD Soil Only When Encountered Within the Limits of Construction, Maintenance, or Other Subsurface Operations

Based on the information in the IT (1998; 1999a; and 1999b) and Montgomery Watson (1998) reports, the LTTD soil placement by the Army was performed in compliance with the then current RWQCB Order (SCRs), which has the same requirements as the current Order, except for the cleanup levels in the freshwater and saltwater ecological protection zones. Therefore, except for sampling as required in Section 3.2.5, the Trust does not need to proactively search out LTTD soil; rather, the Trust will implement specific management processes when LTTD soil is encountered during construction, maintenance, or other subsurface operations. When LTTD soil is found during construction, maintenance, or other subsurface operations, the LTTD soil management processes will be implemented in the area required for the completion of the planned construction, maintenance, or other subsurface operations, unless there is a visual indication that adjacent LTTD soil (outside of the limits of the subsurface work) does not meet the separation requirements of the Order. LTTD soil that appears to extend beyond the limits of planned work will be documented for tracking purposes (Section 3.1), but the Trust is not required to implement active management procedures outside the immediate area of work, unless the separation requirements of the Order do not appear to be met. In such cases, the Trust will implement the management requirements of this Plan.

3.2.4 Verify Compliance with Separation Requirements in Order

When LTDD soil is encountered, the Trust will verify the separation requirements of the Order are consistent with site conditions. Specifically, these include:

- Maintaining a minimum setback distance of fifty feet from any lake, creek, stream, or spring; and
- Verifying that no detectable concentrations of petroleum-related constituents are present in the top 18 inches of excavations backfilled with LTDD soil in landscaped areas.

No soil samples will be collected for chemical analysis to verify the lack of petroleum-related constituents in the top 18 inches of landscaped areas. If odors or staining is present that could be attributable to petroleum-related constituents, the Trust's Petroleum Contingency Plan will apply. If LTDD soil is present within the top 18 inches of landscaped areas, the Trust will add topsoil to meet the 18-inch depth requirement or remove some of the LTDD soil so 18 inches of topsoil can be added to match surrounding grades. The LTDD soil may also be completely removed to achieve the depth requirement and remove the land use control requirements. In addition, the Trust will remove LTDD soil found within 50 feet of any lake, creek, stream, or spring to meet the separation requirements. Removal and disposal of LTDD soil is discussed in Section 3.2.8.

3.2.5 Verify Compliance with Chemical Concentration Requirements in Order

As stated above in Section 2.3, based on the information in the IT (1998; 1998a; and 1999b) and Montgomery Watson (1998) reports, the LTDD soil placement by the Army was performed in compliance with the 1996 RWQCB Order. According to the Montgomery Watson report, all LTDD soil met the residential and terrestrial ecological cleanup levels. The post-treatment soil analytical data indicate that the petroleum hydrocarbon concentrations exceed current freshwater and saltwater aquatic protection zone cleanup levels in approximately 13 batches. Based on the information in the IT reports (1998; 1998a; and 1999b), none of these batches of LTDD soil were known to be used to backfill FDS line, FDS over excavations, or tank excavations in the freshwater or saltwater aquatic protection zones. However, the specific batches of LTDD soil used to backfill excavations at FDS sections BR10-1 and BR10-3 and USTs FDS-1 and 603 are not known. These locations are shown on Figure 1. Therefore, except for the locations in the freshwater and saltwater protection zones listed above where the site-specific post-treatment data are not available, the available information indicates that LTDD soil was placed accordance with the chemical concentration requirements in the Order.

As stated above, based on the Montgomery Watson post-treatment data, all treated LTDD soil met the residential and terrestrial cleanup levels in accordance with the SCRs that governed the LTDD treatment process. Therefore, if LTDD soil is encountered in an area not previously known or marked on Figure 1 and it is located outside the freshwater or saltwater aquatic protection zones, the Trust will assume the treated LTDD soil meets the chemical concentration requirements of the Order, and no sampling or analysis is required to leave the LTDD soil in place or reuse it outside the freshwater or saltwater aquatic protection zones.

However, if LTDD soil is encountered in an area not previously known or marked on Figure 1 within the freshwater or saltwater aquatic protection zones, and the Trust desires to leave the LTDD soil in place, the Trust will collect and analyze soil samples to verify the concentrations of petroleum hydrocarbons, PAHs, and benzene, toluene, ethylbenzene, and xylenes (“BTEX”) are below applicable cleanup levels (Table 1). In addition, the Trust will collect samples of LTDD soil from the areas with no recorded batch numbers (FDS sections BR10-1 and BR10-3 and USTs FDS-1 and 603) and analyze the samples for the same chemicals as above. Specific sampling requirements are discussed below. If petroleum hydrocarbon or related constituent concentrations in the LTDD soil exceed the applicable cleanup levels, the soil must be removed and disposed in accordance with Section 3.2.8 or reused outside the freshwater and saltwater aquatic protection zones.

3.2.6 LTDD Soil Sampling and Analysis

If LTDD soil requires sampling to verify compliance with chemical concentrations in the Order, soil sampling will be performed in accordance with the protocol in this section. LTDD soil sampling procedures and analytical methods will be consistent with those identified in the Presidio-Wide QAPP/SAP (Presidio Trust, 2001) and any future updates. During sampling, field personnel will record the soil classification and any field observations regarding the LTDD soil. LTDD soil samples will be collected from stockpiles (or in situ) at a rate of one 4-point composite for each 50 cubic yards of LTDD soil. This sampling frequency is consistent with or more stringent than the frequency in the former SCRs. The soil samples will be analyzed for total carcinogenic PAHs, total petroleum hydrocarbons as gasoline, diesel, and fuel oil (“TPHg,” “TPHd,” and “TPHfo”), and BTEX. The sample concentrations will be compared to applicable cleanup levels from the Order, summarized in Table 1. Appendix A describes the procedures to identify the applicable human health and ecological land uses, which are needed to identify the applicable cleanup levels. In keeping with Army practice and the Order, the measure of total carcinogenic PAHs is the sum of the concentrations of benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)anthracene, and chrysene. The residential cleanup level for total carcinogenic PAHs is 5.6 mg/kg.

The required minimum sampling frequencies described herein are considered to comply with the QAPP/SAP requirements for the development of data quality objectives (“DQOs”) and for development of a project-specific field sampling plan (“FSP”). Therefore, preparation of new DQOs or a new written FSP will not be required prior to initiating actions at sites with LTDD soil.

If sites with LTDD soil are found in Area A and sampling is required because the LTDD soil is located in the saltwater aquatic protection zone, a written description of sampling activities or other plan will be required to obtain approval from NPS Project Review and 5X to perform sampling. The Trust will submit the necessary planning materials to the NPS in consultation with NPS staff.

The Trust in Area B or the NPS in Area A may choose to have the LTDD soil sampled by the Trust to evaluate if all chemical concentrations meet cleanup levels for complete unrestricted use. If such soil meets those cleanup levels and the RWQCB modifies the separation requirements for LTDD soil in the Order (i.e., no placement within 50 feet of any lake, creek,

stream, or spring and no detectable concentrations of petroleum constituents in the top 18 inches of excavations backfilled with LTDD soil), then LTDD soil no longer needs to be tracked and managed in accordance with this Plan.

3.2.7 Reuse of LTDD Soil

Unless otherwise indicated in Section 3.2.5, when LTDD soil is disturbed as part of a subsurface project, no sampling will be required to leave the LTDD soil in place or reuse the LTDD soil as backfill in the area from which it was removed. In addition, LTDD soil can be relocated to other areas of the Presidio, including placement under roadways, so long as (1) the vertical and horizontal separation requirements of the Order (Section 3.2.4) are met, and (2) the chemical concentration requirements of the Order (Section 3.2.5) are met, and (3) the location is a current or former petroleum remediation site. Relocation of LTDD soil in Area A requires specific approval of the NPS. However, if LTDD soil is being reused at a location disturbed as part of a subsurface project in Area A, replacement of the LTDD soil in the area from which it was removed in accordance with the requirements of the Order will be the responsibility of the NPS, unless the Trust chooses to remove and dispose of the LTDD soil. LTDD soil may be excavated, stockpiled, and reused as backfill without additional testing, provided there is no staining or odors that may indicate contamination of the LTDD soil since placement as backfill. If LTDD soil appears to be chemically impacted, the Trust's appropriate Contingency Plan will apply.

3.2.8 Removal and Disposal of LTDD Soil

Removal of LTDD soil will be limited to the extent necessary to implement the originally intended work that caused the initial disturbance of the soil. However, the Trust may choose to remove and dispose of additional LTDD soil in accordance with applicable laws and regulations so that the tracking and management requirements for that LTDD soil are no longer necessary. Any LTDD soil that remains after construction, maintenance, or subsurface operations will be tracked in accordance with Section 3.1.

Excavated LTDD soil will be temporarily stockpiled on visqueen near the excavation location prior to reuse or removal and off-site disposal. LTDD soil that will not be reused will normally be disposed off-site at a permitted treatment and/or disposal facility in accordance with applicable laws and regulations. Composite soil samples will be collected from the soil stockpile and analyzed to characterize the LTDD soil as required by the disposal facilities. Composite sampling frequencies and sample analytical requirements will be determined on a site-specific basis based on the disposal facility's requirements. After the soil is accepted for disposal at a permitted disposal facility, the soil will be loaded from the stockpile into transport vehicles and transported to the disposal facility.

3.2.9 Special Management Issues in Area A

If LTDD soil is encountered in Area A within the limits of construction, maintenance, or other subsurface operations, NPS will notify the Trust environmental staff of the discovery. The Trust will implement the management requirements described in Sections 3.2.3 through 3.2.6 and 3.2.8. The NPS will be responsible for implementing the notification and segregation activities described in Sections 3.2.1 and 3.2.2 and reuse activities described in Section 3.2.7 for LTDD

soil encountered in Area A. If LTDD soil meets the provisions of the Order, as described in Sections 3.2.4 and 3.2.5, then the LTDD soil may be left in place or reused and tracked by the Trust and the NPS.

If any action is required beyond leaving the LTDD soil in place or reusing the LTDD soil at the same location, a written description of the plan of approach, including any necessary sampling activities, will be required to obtain approval from NPS to perform sampling and/or removal. The Trust will submit the necessary planning materials to the NPS in consultation with NPS staff.

If any of the requirements of the Order are not met, the Trust will remove the LTDD soil from the site in accordance with this Plan. The Trust's responsibility for removal only includes (1) the material required to implement the construction, maintenance, or other subsurface operations that were originally in progress when the LTDD soil was encountered or (2) LTDD soil that does not meet the Order requirements.

The Trust, with concurrence from the NPS, may also choose to completely remove all encountered LTDD soil in Area A (whether or not required for construction, maintenance, or other subsurface operations access and progress). If LTDD soil outside the immediate construction area remains in place, the Trust and NPS will track such LTDD soil in accordance with Section 3.1 of this Plan. The Trust may also choose to remove the LTDD soil from Area A (with concurrence from the NPS) and reuse the LTDD soil in Area B in accordance with the reuse policy of this Plan or dispose of the soil in accordance with applicable laws and regulations.

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TABLE 1
HUMAN HEALTH AND ECOLOGICAL CLEANUP LEVELS FOR PETROLEUM HYDROCARBONS AND CONSTITUENTS IN
SOIL AND SEDIMENT AT THE PRESIDIO OF SAN FRANCISCO

Presidio of San Francisco, California

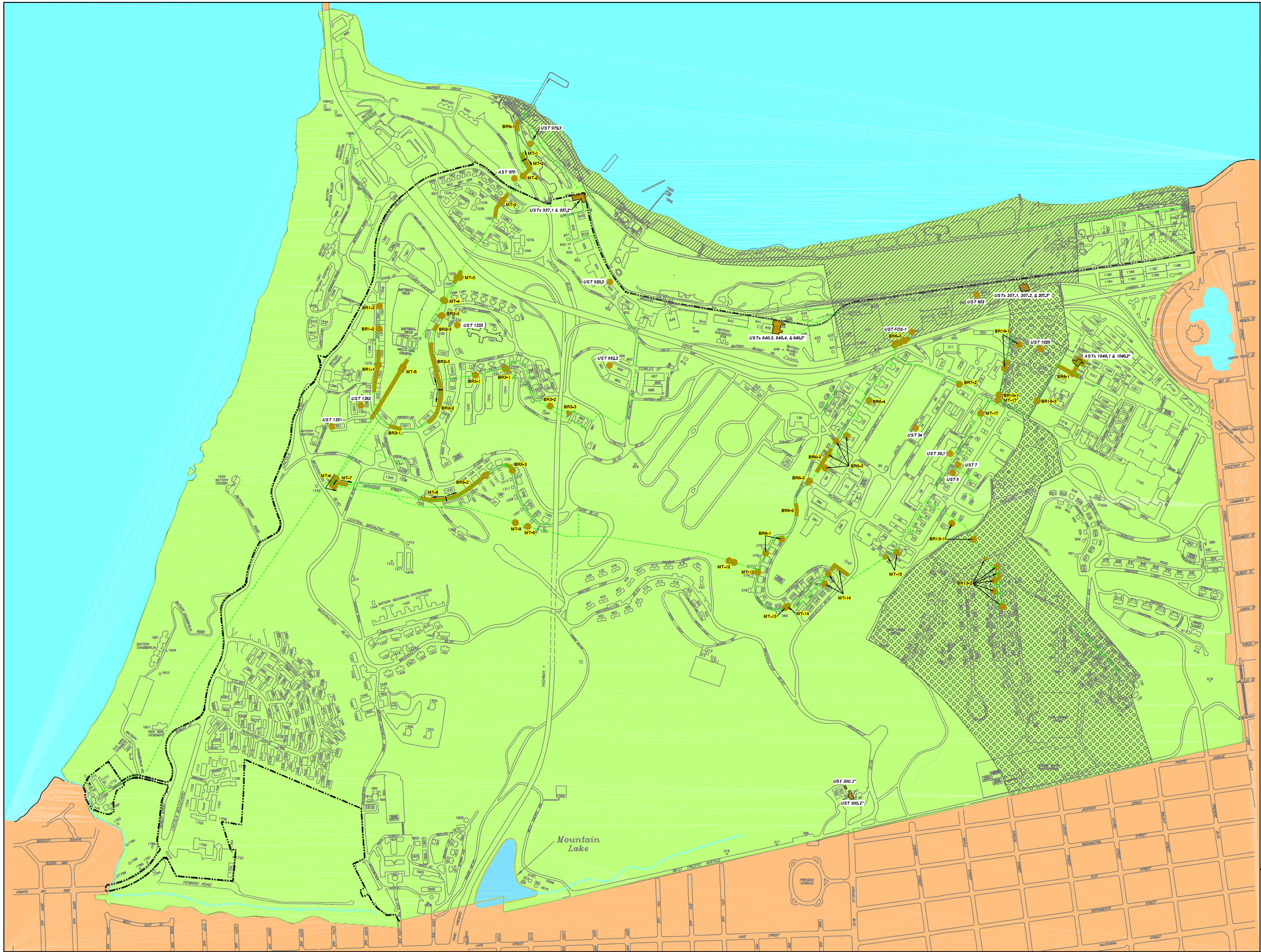
Potential Chemical of Concern	Protection of Human Health			Protection of Ecological Receptors			Protection of Groundwater Resources					
							Cleanup Level for Soil to Maintain Drinking Water Standard in Groundwater		Cleanup Level for Soil to Maintain Non-detectable Concentration in Groundwater in Lobos Creek Basin		Cleanup Level for Soil at Crissy Field	
	Residential (mg/kg); (a)	Recreational (mg/kg); (a)	Maintenance (mg/kg); (a)	Terrestrial Receptors (mg/kg); (a)	Freshwater Aquatic Receptors (mg/kg); (a)	Saltwater Aquatic Receptors (mg/kg); (a)	Less than 5 feet Above Groundwater (mg/kg); (a)	Greater than 5 feet Above Groundwater (mg/kg); (a)	Less than 5 feet Above Groundwater (mg/kg); (a)	Greater than 5 feet Above Groundwater (mg/kg); (a)	Less than 5 feet Above Groundwater (mg/kg); (a)	Greater than 5 feet Above Groundwater (mg/kg); (a)
Inorganic Chemicals												
Lead	400	500	400	50 (b)	-	-	-	-	-	-	-	-
Semivolatile Organic Compounds												
Anthracene	5,900	13,800	17,800	-	-	-	308	-	0.05	-	1,120	-
Benzo(a)anthracene	0.43	1	1.5	-	-	-	8	-	0.2	-	23	-
Benzo(a)pyrene	0.04	0.1	0.15	0.3	-	-	3	-	0.8	-	9	-
Benzo(b)fluoranthene	0.43	1	1.5	-	-	-	23	-	0.6	-	64	-
Benzo(g,h,i)perylene	620	1,400	1,700	-	-	-	5,040	-	2	-	19,500	-
Benzo(k)fluoranthene	0.43	1	1.5	-	-	-	23	-	0.6	-	64	-
Chrysene	4.3	10	15	-	-	-	54	-	0.3	-	151	-
Fluoranthene	820	1,900	2,300	-	-	-	316	-	0.05	-	1,160	-
Fluorene	770	1,800	2,300	-	-	-	60	-	0.05	-	220	-
Naphthalene	480	1,100	2,300	-	-	-	9	-	0.05	-	140	-
Phenanthrene	600	1,400	1,700	-	-	-	86	-	0.05	-	410	-
Total Carcinogenic PAHs	5.6	13	19.7	-	-	-	111	-	2.5	-	253	-
Pyrene	620	1,400	1,700	-	-	-	241	-	0.09	-	910	-
Petroleum Hydrocarbons and Constituents												
TPH (as diesel); (c)	1,380	3,200	6,700	700	140 (d)	144	115	15,000	7	15,000	1,950	15,000
TPH (as gasoline)	1,030	2,400	5,900	610	140	11.6	100	5,000	7	5,000	1,690	5,000
TPH (as fuel oil) (e)	1,900	4,500	9,400	980	140 (d)	144	160	15,000	10	15,000	2,730	15,000
Benzene	0.6	1.5	5	40	0.79	50	0.005	140	0.005	140	1	140
Ethylbenzene	840	1,900	6,600	125	15	5	13	60	0.009	60	19	60
Toluene	530	1,200	12,800	270	3	260	1	420	0.005	420	14	420
Total Xylenes	1,080	2,500	109,000	55	5.7	22	33	180	0.009	180	4,340	180

TABLE 1
HUMAN HEALTH AND ECOLOGICAL CLEANUP LEVELS FOR PETROLEUM HYDROCARBONS AND CONSTITUENTS IN
SOIL AND SEDIMENT AT THE PRESIDIO OF SAN FRANCISCO

Presidio of San Francisco, California

Notes:

- (a) Cleanup level values listed are obtained from Tables 1 through 7 of California Environmental Protection Agency, Regional Water Quality Control Board, San Francisco Bay Region *Order No. R2-2003-0080, Revised Site Cleanup Requirements and Rescission of Order No. 91-082 and Order No. 96-070*, dated 20 August 2003 ("Order").
- (b) According to the Order, this value for lead applies only to cleanup of leaded gasoline releases and not from releases from any other sources.
- (c) Total petroleum hydrocarbons ("TPH")
- (d) Cleanup level values listed are obtained from *Draft Development of Freshwater TPH-diesel and TPH-fuel oil Point of Compliance Concentrations, Presidio of San Francisco, California*, prepared by BBL and dated 15 July 2004, and approved by the Regional Water Quality Control Board on 7 September 2004. Cleanup levels listed are for all TPH-contaminated areas within the Freshwater Ecological Protection Zone ("FEPZ"), except as follows:
 - (1) The cleanup levels for the Building 1065 Corrective Action Plan ("CAP") and Fill Site 6B areas will be determined in a future document.
 - (2) For areas within the FEPZ north of Lincoln Boulevard and outside of the Building 1065 CAP and Fill Site 6B areas, the saltwater receptor values will apply
 - (3) For areas within the FEPZ south of Lincoln Boulevard, the terrestrial value will apply if the site is located outside the zone of application.The decision diagram to identify the zone of application for a given site is included in Appendix B of this report.
- (e) These values also apply to TPH quantified as motor oil



N

0400800

(Approximate Scale in Feet)

LEGEND

●

Remedial Excavation Backfilled With LTLD-Treated Soil

—

FDS Trench Backfilled with LTLD-Treated Soil

BR15-1

FDS Section ID With LTLD-Treated Soil in Backfill

UST 603

Tank ID With LTLD-Treated Soil in Backfill

FDS Pipelines Removed or Abandoned In-place

Area A/B Boundary

Saltwater Protection Zone

Freshwater Protection Zone

Existing Building

Former Building

Abbreviations:

FDS Fuel Distribution System

LTLD Low Temperature Thermal Desorption

- Notes:
1. Base map was provided by the Presidio Trust.

2. All locations are approximate.

3. Information about FDS obtained from the report prepared by International Technology Corporation, entitled "Fuel Distribution System Closure Report", and dated May 1999.

4. "-" denotes outline of excavation area is shown.

APPENDIX A

Land Use and Cleanup Levels

APPENDIX A

LAND USE AND CLEANUP LEVELS

Soil cleanup levels established for the Presidio are intended to protect human health and the environment, including water quality. U.S. EPA (1995, 1991, 1989) requires response actions to take into account possible changes in land use that might result in different exposure scenarios in the future. Future land uses were considered in the development of the cleanup levels for petroleum hydrocarbons and related constituents. Designated land uses at the Presidio and applicable petroleum related cleanup levels at the Presidio are described below.

A.1 Source of Cleanup Levels

Cleanup levels for petroleum hydrocarbons and related constituents in soil at the Presidio are presented in RWQCB Order R2-2003-0080. The soil cleanup levels from the Order are listed in Table 1. In order to comply with Task 2 of RWQCB Order R2-2003-0080, the Trust is has developed new cleanup levels for extractable petroleum compounds to be applied within the freshwater ecological protection zone (BBL, 2004). These cleanup levels were approved by the RWQCB in a letter, dated 7 September 2004, and have been incorporated in Table 1.

Applicable cleanup levels are selected based on the designated land use at individual sites at the Presidio. A summary of designated land uses at the Presidio is provided below in Section A.2. A summary of applicable petroleum cleanup levels at Presidio sites is provided in Section A.3.

A.2 Planned Land Use at the Presidio

Land use at the Presidio is governed by two principal documents. The 1994 General Management Plan Amendment (“GMPA”) is used by NPS to guide land use in Area A. The May 2002 Presidio Trust Management Plan (“PTMP”) defines land use in Area B.

Figures A-1 and A-2 depict planned human and ecological land use at the Presidio. Four broad categories of land use are defined in the PTMP. These categories consist of residential, recreational, institutional (education/conference) and industrial uses. The hatch type on Figure A-1 shows residential, recreational, institutional, and commercial/industrial areas on the Presidio. The color type depicts the corresponding cleanup levels that will protect people who reside, work, or visit these areas. Suitable cleanup levels are defined by the most sensitive population that is reasonably associated with the planned land use.

A.2.1 Residential

Significant portions of the Presidio are designated as residential areas. Residential cleanup levels are applied to areas at the Presidio that have the following land uses:

- Residential: Residential use is designated for single family housing and the grounds generally extending 150 feet from the structures in all directions, as well as playgrounds, and common areas near such housing.
- Institutional (Educational/Conference): As described in the GMPA and PTMP, several areas of the Presidio will be used as educational/conference centers. Housing in these areas will provide permanent and temporary lodging for tenant employees and their families, visiting scholars, students, and researchers. While the land use in these areas generally is described as institutional, the potential exposure scenarios for people living in such housing are comparable to those living in single-family residences. Accordingly, residential cleanup levels are applied to institutional housing.

A.2.2 Recreational

Recreational cleanup levels are applied to areas at the Presidio that have the following land uses:

- Commercial/Recreational: Areas and the surrounding open spaces surrounding such places as museums, visitor centers, and park partner buildings will be frequented by recreational users, including children who likely will be picnicking and playing in the areas surrounding the buildings (e.g., the Main Post and Crissy Field). At sites having such mixed or multiple uses, the population having the most significant risk (i.e., the most sensitive user) determines the applicable cleanup levels. For the Presidio, the most sensitive populations frequenting commercial/recreational areas are recreational users.
- Open Spaces: Areas of the Presidio not designated as residential, institutional, commercial/recreational, or industrial use areas are open spaces. Recreational users will frequent open spaces. Accordingly, recreational cleanup levels are applied in such areas.

A.2.3 Commercial/Industrial

As shown on Figure A-1, only a small portion of the Presidio is considered solely commercial/industrial or maintenance. These commercial/industrial areas consist of the water treatment plant area and the Trust's maintenance facilities at Building 1750. Commercial/industrial or maintenance cleanup levels are applied to these areas.

A.2.4 Ecological

The planned and existing ecological land use areas depicted on Figure A-2 encompass most open spaces and recreational areas. Figure A-2 also includes saltwater and freshwater ecological protection zones defined in the Order. In the Order, the Tennessee Hollow riparian corridor, Crissy Field wetlands, and a 150-foot buffer along the Crissy Field shoreline are identified as sensitive habitats requiring more stringent petroleum hydrocarbon cleanup levels than elsewhere on the Presidio. The area where more stringent petroleum cleanup levels apply to the Tennessee Hollow riparian corridor is designated as the freshwater ecological protection zone. The area where more stringent petroleum cleanup levels apply to the Crissy Field wetlands and shoreline is designated as the saltwater ecological protection zone.

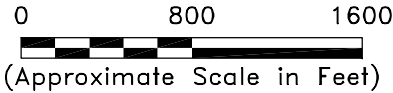
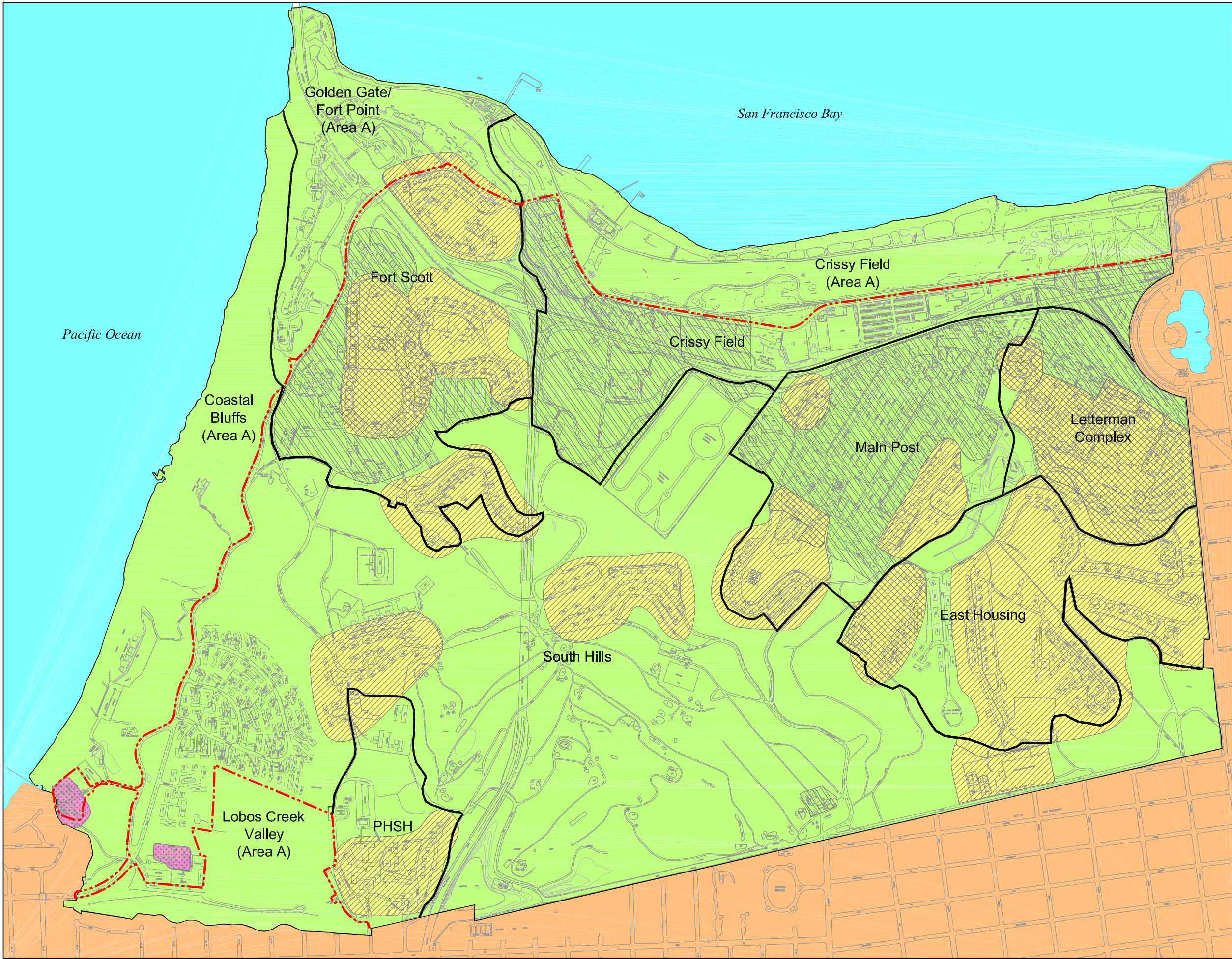
The PTMP and the May 2001 *Vegetation Management Plan* (“VMP”) identify the most ecologically sensitive areas and special status species¹ areas as the land designated for open space and recreational use (e.g., forested areas of South Hills, Coastal Bluffs, Lobos Creek), and the areas designated as the ecological protection zones (i.e., Crissy Field wetlands, Crissy Field shoreline, and concomitant drainage area that includes the Tennessee Hollow riparian corridor). Figure A-2, from the *Final Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisco, California*, (EKI, 2002) (“Presidio-Wide Cleanup Level Document”), the Trust delineates areas where buffer zone and ecological special status cleanup levels are applicable. For petroleum hydrocarbons and related constituents, the Terrestrial Receptors ecological cleanup levels in Table 1 are applicable to areas designated as buffer zone or ecological special status areas. No ecological cleanup levels apply to areas on Figure A-2 designated for only for human health cleanup levels.

A.3 Soil Cleanup Levels at Sites with LTTD Soil

The petroleum hydrocarbon cleanup levels in Table 1 of this Plan are taken from Tables 1 through 7 of RWQCB Order No. R2-2003-0080 and from RWQCB-approved point of compliance concentration report for the freshwater ecological protection zone (BBL, 2004), and include levels to protect human health, ecological receptors, and groundwater quality. Applicable cleanup levels for sites with LTTD soil are determined as follows:

- For protection of human health, determine the applicable cleanup level in Table 1 based on the anticipated land use (Figure A-1).
- For protection of ecological receptors, determine whether the site is upland (terrestrial receptors only) and/or within the saltwater or freshwater ecological protection zones defined in the Order (Figure A-2). The applicable ecological cleanup level is the most stringent value in Table 1, based on the applicable ecological receptors at the site.
- For protection of groundwater quality (i.e., soil leaching), determine the depth to groundwater and the groundwater basin (see Figure A-3). Use the cleanup level listed in the applicable column in Table 1.
- The overall applicable cleanup level is the most stringent of the applicable cleanup levels for protection of human health, protection of ecological receptors, and protection of groundwater resources.

¹¹ Special status species include those species that are listed or proposed for listing as threatened or endangered under federal or state Endangered Species Acts, the California Native Plant Protection Act, the Migratory Bird Treaty Act, California Species of Special Concern as defined by the California Department of Fish and Game, or protected by other laws.



LEGEND

- Area A/B Boundary
- Presidio Planning Area or District Boundary

**Planned Human Land Use
(Note 4)**

- Planned Residential Use
- Planned Commercial/Recreational Use
- Planned Institutional Use (Educational/Conference)
- Planned Commercial/Industrial Land Use

Appropriate Soil Cleanup Level

- Residential Cleanup Level
- Recreational Cleanup Level
- Commercial/Industrial Cleanup Level

Notes:

1. All locations are approximate.
2. Basemap developed from site plan provided by the Presidio Trust.
3. Designated human land use is based on the National Park Service's Final General Management Plan Amendment ("GMPA"), dated July 1994, and Presidio Trust Management Plan ("PTMP") dated May 2002.
4. Planned human land use is recreational if none of the above patterns are shown.
5. Appropriate cleanup levels are based on the most restrictive human land use defined in the GMPA and PTMP.
6. PHS is the Public Health Service Hospital Planning Area.

**Erler &
Kalinowski, Inc.**

Planned Human Land Use
at the Presidio



Presidio Trust
San Francisco, CA
November 2004
EKI A000003.13
Figure A-1



N

0 800 1600

(Approximate Scale in Feet)

LEGEND

--- Area A/B Boundary

— Presidio Planning Area or District Boundary

Ecological Protection Zones (Note 3)

▨ Saltwater Ecological Protection Zone

▤ Freshwater Ecological Protection Zone

Appropriate Soil Cleanup Level

□ Human Health Cleanup Level (Developed Areas Outside Ecological Protection Zones)

■ Buffer Zone Ecological Cleanup Level (Manicured Open Space Areas)


■ Special Status Ecological Cleanup Level (See Note 4)

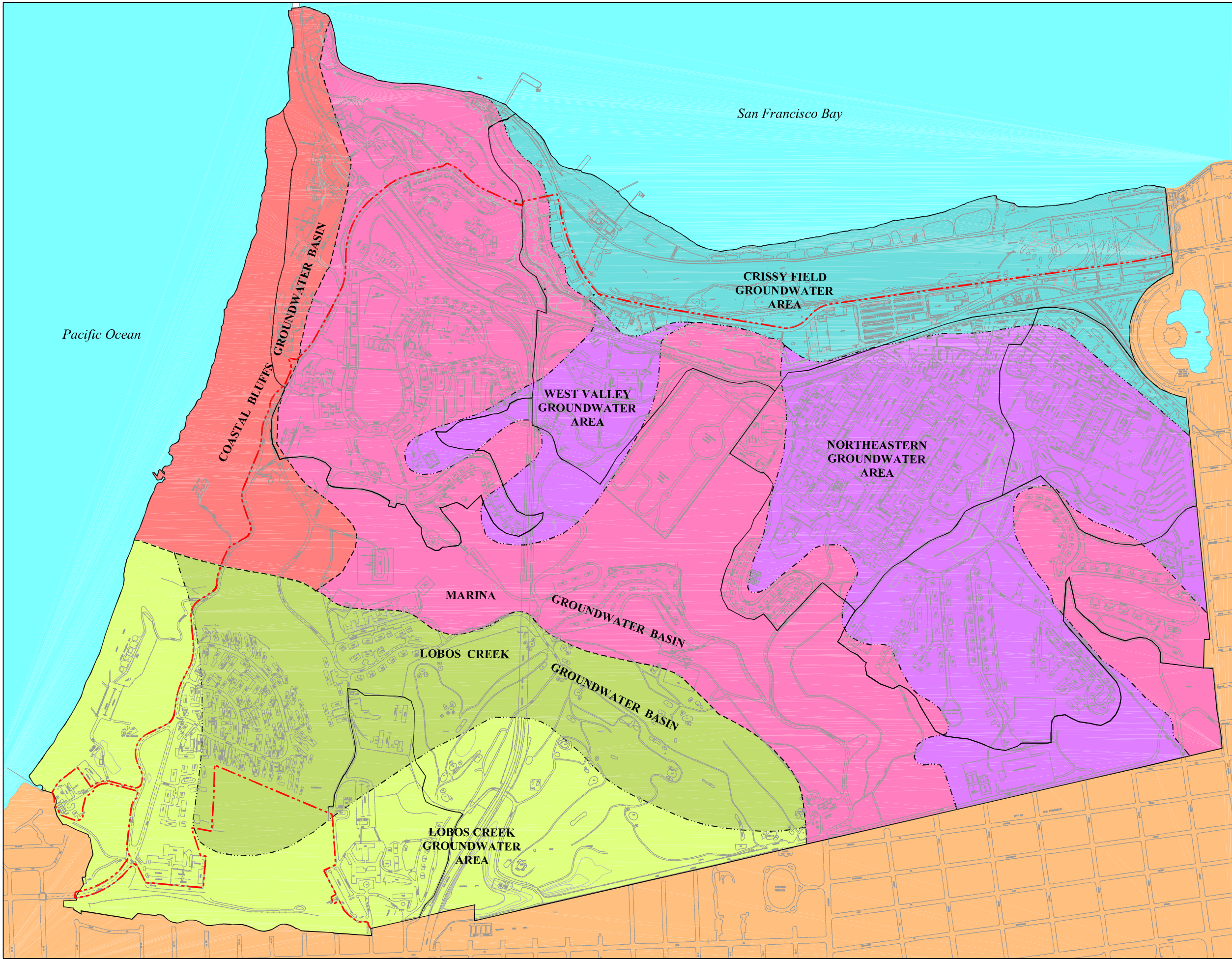
Notes:

1. All locations are approximate.
2. Basemap developed from site plan provided by the Presidio Trust.
3. Ecological Protection Zones are defined in California Regional Water Quality Control Board, Order No. R2-2003-0080, dated 20 August 2003.
4. Special Status Ecological Areas include Native Plant Community Zones, Historic Forest Zones, and Special Management Zones identified in the Vegetation Management Plan and Environmental Assessment, NPS and Presidio Trust, December 2001.
5. PHS is the Public Health Service Hospital Planning Area.

Erler & Kalinowski, Inc.

Planned Ecological Land Use at the Presidio

 Presidio Trust
San Francisco, CA
November 2004
EKI A000003.13
Figure A-2





(Approximate Scale in Feet)

LEGEND

- Groundwater Basin Boundaries
- . - . - Groundwater Area Boundaries
- Area A/B Boundary
-  Coastal Bluffs Groundwater Basin
-  Lobos Creek Groundwater Basin
-  Lobos Creek Groundwater Area
-  Marina Groundwater Basin
-  West Valley and Northeastern Groundwater Area
-  Crissy Field Groundwater Area

Notes:

1. All locations are approximate.
2. Figure modified from Montgomery Watson, Draft Basewide Groundwater Monitoring Plan, July 1996.

Erler & Kalinowski, Inc.

Groundwater Basins and Areas at the Presidio



Presidio Trust
San Francisco, CA
November 2004
EKI A000003.13
Figure A-3

APPENDIX B

Decision Diagram for Zone of Application

(from BBL, 2004)

**Figure 3.2. Decision
Diagram for Zone of
Application**

